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Information Disorder: Increasing Interest Through Video Games

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Abstract:

The widespread use of social media and digital platforms for information consumption highlights the critical need to understand and address information disorder. This paper investigates the potential of games aimed at fostering players' interest in information disorder. Extensive research was conducted on this subject, including media literacy strategies, and the impact of transformational games on individuals' perspectives and interests. The culmination of this study was the development of a strategy deckbuilder game prototype called *Web of Lies*. An experiment involving 88 participants across two conditions was conducted to address the research question: "*How can a video game increase players' interest in information disorder?*" The experiment utilized a Likert scale and conducted statistical analyses employing both within- and between-subjects designs. The results revealed no significant increase in participants' interest in information disorder following gameplay. However, further experiments could be conducted using different types of video games, to further explore the research question.

Information Disorder: Increasing Interest Through Video Games

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***Abstract*—The widespread use of social media and digital platforms for information consumption highlights the critical need to understand and address information disorder. This paper investigates the potential of games aimed at fostering players' interest in information disorder. Extensive research was conducted on this subject, including media literacy strategies, and the impact of transformational games on individuals' perspectives and interests. The culmination of this study was the development of a strategy deckbuilder game prototype called *Web of Lies*. An experiment involving 88 participants across two conditions was conducted to address the research question: "*How can a video game increase players' interest in information disorder?*" The experiment utilized a Likert scale and conducted statistical analyses employing both within- and between-subjects designs. The results revealed no significant increase in participants' interest in information disorder following gameplay. However, further experiments could be conducted using different types of video games, to further explore the research question.**

***Index Terms*—information disorder, media literacy, video games, transformational games**

I. Introduction

Today's media is saturated with content that aims to elicit strong emotions such as fear, anger, or superiority, in an effort to gain online engagement. With social media platforms designed to increase engagement through likes, comments, and shares, emotional content can spread rapidly, even in the face of fact-checking and debunking efforts by various organizations (Wardle et al., 2017). Educating individuals on media literacy is increasingly crucial to equip them with the mindset for critical thinking concerning the abundance of information available online (Kubey, 1997). This should encourage to consider both the accuracy and intentions behind shared information, as well as the individuals responsible for its dissemination (Wardle et al., 2017).

This study was conducted as part of a collaborative project between three different teams with the goal of creating a video game that aims to convey the message of information disorder (Kandel, 2020) and media literacy (Potter, 2018). Two of these teams were project groups from the Medialogy Master's program: our own group (performing this study) and another group consisting of fellow students Simonas Čeponis and Kristinn Bragi Garðarsson (explained further in section III-A). Together the five of us have, through the Aalborg University Startup Program[1], founded the video game company Enlit Games. As part of our shared internship in the Startup Program, we made a business connection with the third team in this collaboration - Get Media Savvy - an American collective advocating for media literacy. Thus, both this study, and the one conducted by the other Medialogy student team were based on a collaboration between Enlit Games and Get Media Savvy (GMS).

Collectively, we believe that video games are a well-suited medium to spread information about the significance of media literacy to a broader audience. By providing players with a platform to observe the impact of information disorder firsthand, they can gain awareness of its effects on a larger scale, and become interested in how to employ critical thinking when navigating online.

To that end, we put forth the research question:

> *How can a video game increase players' interest in information disorder?*

This report first covers research pertaining to information disorder and transformational games (chapter II). Then, the Prototype design (chapter III) covers all elements of the developed game prototype which were based on concepts of information disorder and media literacy. Next, the Methods chapter (chapter IV) describes the testing procedure as well as the development of our questionnaire. After the final test procedure, the collected experiment data is analysed in the Findings (chapter V). The Discussion (chapter VI) then addresses various subjects concerning the insights derived from this data analysis, as well as the potential factors that could have affected the data. Lastly, the Conclusion (VI-C1) aims to summarise the whole study.

The appendices include an overview of all the cards designed for the game prototype (Appendix A), notes from game designer interviews (Appendix B), the game design document of the game (Appendix C), the full questionnaire used during testing (Appendix D), and the demographic data collected from the test participants (Appendix E).

II. Background

A. Get Media Savvy Collaboration

The collective of Get Media Savvy was jointly established by two experts in the field of media literacy: creative technol-

[1]Aalborg University Startup Program - a program focused on entrepreneurship, helping students start and run their own start-up business.

ogist and researcher Heidi J. Boisvert, as well as writer and media ecologist Julie Scelfo.

Our collaboration with Get Media Savvy (GMS) for this study mainly revolved around receiving guidance and input from the two founders through a series of meetings. These meetings took place throughout the ideation and development phases of the game prototype developed for this study. The main topic of our meetings focused on how information disorder and media literacy could be conveyed through a video game and which topics would be most fitting for this medium.

Based on our discussions with GMS, we reached the conclusion that a good focus point for the study would be the set of four main questions, as formulated by J. Scelfo in her talk (Scelfo, 2019). These questions aim to help people think critically about any type of media:

- What motivated this message?
- What information might be missing?
- Whose perspective am I getting?
- Who profits?

The four questions served as a baseline for how the manipulative power of online information could be showcased in our video game prototype, with a focus on inspiring the player to ask similar questions when presented with information either within or after having played the game. However, instead of presenting these directly as action points in the game, GMS suggested that the game should instead aim to convey these elements naturally in the gameplay and/or narrative. Following this, we focused on making the player interested in researching more on the topics themselves after playing the game, rather than risk the game being too "preachy" in trying to educate the players directly. If the message came across as preachy or overly persuasive, it may trigger reactance in the recipient, leading to resistance or a negative reaction.

Additionally, our collaboration with GMS indicated our target group, as the video game would be designed to potentially assist in their campaigns for media literacy. GMS does not have a limited target group, but instead aims to "reach the masses" (Get Media Savvy). As such, our target group is similarly broad, focusing on individuals who play video games and use digital media for communication.

B. Media Literacy

Media literacy has numerous definitions. Aufderheide (1993) claims that media literacy is the ability to "*access, analyze, and produce information for specific outcomes*". While a description from Media Education Foundation (n.d.) focuses on the ability to understand, assess, and think critically about the meaning behind the media content. Another definition suggested by National Association for Media Literacy Education (NAMLE) combines both explanations. It builds on the definition from Aufderheide (1993), adding evaluation and action as other components of media literacy and emphasizing the ability to apply media literacy to different types of communication. NAMLE defines media literacy as: "*the ability to encode and decode the symbols transmitted via media and synthesize, analyze and produce mediated messages*" (NAMLE, 2021), which is also the definition that we subscribe to. Furthermore, NAMLE emphasizes that media creates impressions using combinations of words, images, and sounds affecting people's attitudes, beliefs, and behaviors. Therefore, developing skills such as critical thinking works towards becoming media literate, which in turn empowers people to make their own decisions (NAMLE, 2021).

According to the European Association for Viewers Interests (EAVI), media literacy aims to promote critical understanding among individuals as it influences how people approach media's content and context (EAVI, 2009). In their study, they suggest different ways of improving media literacy among individuals by involving authorities in creating new policies and encouraging the media industry to introduce new media literacy initiatives into the media content.

1) Critical Thinking: When promoting critical thinking in the context of media literacy (EAVI, 2009; Media Education Foundation, n.d.), the main goal is to make people question the information they receive online. As part of the Get Media Savvy collaboration (section II-A), we presented the four questions proposed by Scelfo (2019). Similarly, different advocates for media literacy will often present their own set of questions that they consider to be the central guideline to thinking critically about media (NAMLE, 2022; Wardle et al., 2017). Despite the differing sets of questions, certain key ideas are repeated across all of them:

- The person sharing the information might not have good intentions behind sharing it.
- The information might not be completely truthful.
- It might be possible to misinterpret the information without the proper context.

All of these points focus on potential issues with the shared information. This information would then fall under what is often referred to as *information disorder* (Wardle et al., 2017). Active critical thinking is most often taught and utilized in an educational context. However, even for personal knowledge acquisition people are also showing distrust towards information outlets when using online sources (Head et al., 2018). Despite this, people are much more likely to put in the effort to verify the information they read and/or share academically compared to their personal media usage (Head and Eisenberg, 2010). This tendency highlights the importance of teaching about media literacy and critical thinking in a non-academic context, so that people may learn to better evaluate the information they take in during their day-to-day lives (Kubey, 1997)

C. Different Types of Information Disorder

The term *information* refers to the imparting of knowledge (Oxford English Dictionary, b), *disorder* then implies that the intent behind the supposed information is different from the assumed code of conduct for knowledge sharing (Oxford English Dictionary, a). This definition is broad; however, in the context of media literacy, the main focus is on two aspects of the shared information (Baines et al., 2020; Kandel, 2020):

1) How truthful the information is. This is an objective measurement that can operate on a scale, based on how much of the shared information is falsified or interpreted based on personal bias.
2) The intention of the sender when sharing the information. Though intent can be divided into many different factors, our main focus here is on whether the information was intended to be harmful to the receiver.

Based on these two aspects, information disorder refers to the negative areas and overlaps between them. These areas have been named mis-, dis- and malinformation. The Council of Europe (Wardle et al., 2017) defines the three types as:

- "**Misinformation** is when false information is shared, but no harm is meant".
- "**Disinformation** is when false information is knowingly shared to cause harm".
- "**Malinformation** is when genuine information is shared to cause harm, often by moving information designed to stay private into the public sphere".

These three types can be illustrated using the previously-discussed aspects of falseness and intention to harm, giving a simple visual overview of the three terms and their relationship as seen in Figure 1.

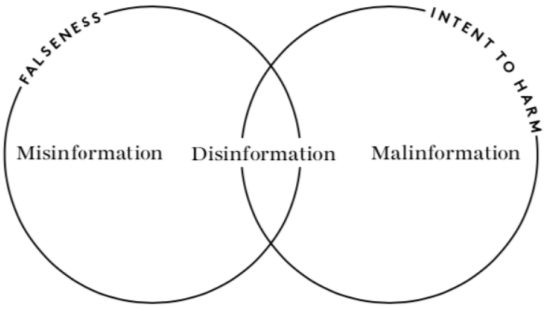

Fig. 1. Overlap and difference between mis-, dis- and malinformation (Wardle, 2020).

Though all three types of information can be harmful, malinformation is a more nuanced case, as all the presented information is truthful; thus the harm comes more from the context than the specific information itself. For this project, we instead focused on mis- and disinformation, as these are simpler to identify by the nature of their claimed information being verifiable.

1) Categories of Mis- & Disinformation: In her article, Wardle (2017), strategy and research lead at First Draft News, has broken down the main characteristics of the mis- and disinformation that gets shared online. Based on this, she has formulated a typology to classify different types of problematic content, as seen in Figure 2.

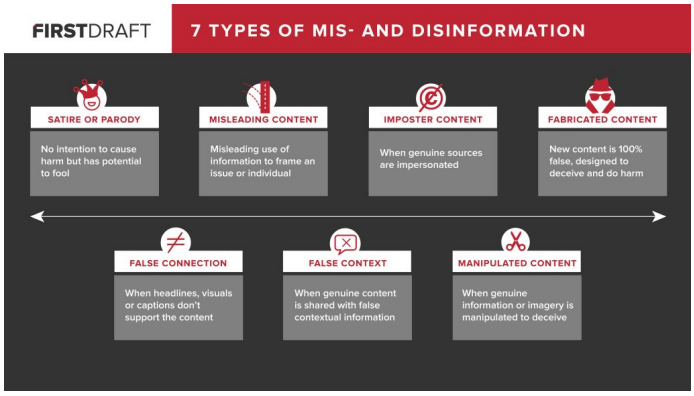

Fig. 2. Seven categories of mis- & disinformation. The scale measures the degree to which the sender of information intended to deceive the receiver (Wardle, 2017).

With our goal to increase people's interest in how the information that they see online is manipulated to influence them, we believe that this categorization will be very useful. By using these seven types as a baseline, we can cover and showcase the wide spectrum of different types of common online mis- & disinformation.

D. Transformational Games

Increasing interest in information disorder can be done through many mediums, including video games. A game with an aim to change the player's perception of the world in this way could be described as a *transformational game* (Culyba, 2018). The need to evoke a change or transformation through video games can be applicable in many forms, including education or learning (Perednytė et al., 2022; Williams, 2018), health-related behavior change (Farič et al., 2021), raising awareness about societal issues (Bogost, 2008), among many others. While the Get Media Savvy collective's higher purpose is to educate people and raise awareness about media literacy, designing a potential transformational game to raise interest on the topic may assist in accomplishing this goal.

Independent designer S. Culyba developed a framework for designing transformational games and evaluating the effectiveness of the change (Culyba, 2018). The framework highlights two main types of transformations: **knowledge** (learning new information) and **skill** (being able to do something new). However, change in knowledge or skill can further affect change in the player's health, feelings/attitudes, acts, beliefs, perceptions, values, and connections. For this study, the aim of the video game would be to achieve the change in belief, which is described as "*the player's sense of truth is altered*" and encompasses perception and world view (Culyba, 2018). By determining the intended transformation of the player, it is then possible to form a foundation for evaluating the video game and determining the level of success achieved in terms of transformational impact. To measure the impact, it is beneficial to first determine the player's *initial state* - their knowledge, experience, and feelings before playing the game (Culyba, 2018).

Finally, it is essential to highlight that the transformations experienced by players are not necessarily directly related to the actions a player will take within the game. Instead, they encompass the specific ways in which the game affects the player, potentially resulting in long-term effects that persist beyond the immediate gameplay experience. These ideas suggested by the transformational framework and the Get Media Savvy collective's higher purpose further inform our game's development.

III. Prototype Design

This chapter will outline the design of the video game prototype *Web of Lies*, with a focus on the portrayal of information disorder. The *Web of Lies* prototype is a strategy deckbuilder game, and consists of 7 levels with increasing difficulty. As mentioned previously in section II-A, the four questions proposed by J. Scelfo served as reference points during the design process, for the kind of thoughts we aimed to inspire in players. An outline of the planned design of the full game can be found in Appendix C.

A. Game Development Collaboration

As mentioned in the introduction (chapter I), the video game prototype for this study was developed in collaboration with another study group, consisting of the other members of Enlit Games. Half of this collaboration was based on media literacy implementation and evaluation in a video game (this study), and the other half focused on developing a tool for game balancing (Garðarsson et al., 2023). The game design choices were split between the two groups and studies. This means that not all design decisions were made specifically to fit with this study's research question, but instead to benefit both studies, sharing the goal of making the game an enjoyable player experience.

B. Narrative Setting

The narrative setting of the game was used as the lens through which the player experiences the potential effects of information disorder.

The game portrays a medieval fantasy setting, putting the player in a different context of how they usually experience and interact with information. This aims to showcase information disorder on a smaller and more manageable scale, compared to the widespread information networks of social media. The fantasy setting also allows for more metaphors and allusions, which in turn minimizes the possibility of the game appearing too preachy or didactic, which can cause a negative/opposite reaction.

1) Premise: The narrative premise follows a tyrannic king, who is struggling to keep the people united under his reign. A rebellion is on the rise in the towns and cities of the kingdom. The rebellion is growing to a point where it is fueling itself by reinforcing the people's belief that the king must be taken down through the constant spread of gossip among the rebels.

The player takes the role of a spymaster who is sent by the king to dismantle this rebellion. To accomplish this, the player goes undercover as a barkeep, listening in on rumors and spreading disinformation and *propaganda* among the patrons, slowly breaking down the people's *rebellious spirit*. As the *rebellious spirit* of the people dwindles, community leaders will show up trying to restore their resolve, and the player will need to break their *spirit* as well.

2) Story: Throughout the game, the player is presented with story pieces both before and after each level, as shown in Figure 3 and Figure 4.

Fig. 3. Screenshot from the level select screen, with displayed narrative before starting the level.

Fig. 4. Screenshot from the game's reward screen, with the narrative presented alongside a selection of cards.

The aim of the story was to portray how the spread of disinformation affects people, as well as explain the game mechanics in a manner that makes sense for the setting. The table below shows what story pieces the player receives at different points in the game:

Before entering the level	After completing the level
Contract Details. You have been ordered by the king to dismantle the growing rebellion. Infiltrate the local tavern, collect what rumors you can find, and use your Agents to spread misinformation among the people and lower their rebellious spirit.	
Set up information chains among the people to help your Agent spread propaganda for the king.	**Status Report.** We have collected some rumors, anything can be twisted to our advantage, let us use it to further the mission.
Special people will start showing up to rally the people. They may interfere with your plans, so keep an eye out for them.	**Noticeable Change.** Some of the more influential people among the rebels are starting to notice. You should expect some of them to show up soon to try and get the crowd back under control.
The rebels are increasing their rallying efforts. Make sure to break them down faster than they can rebuild their spirits.	**Increasing Influence.** The bards are failing to reignite the people's rebellious spirit. The rebellion's leaders are getting more desperate.
A merchant from a neighboring country has shown up. Keep a careful eye on them, as they might try to spread counter information encouraging the rebellion.	**Counter Measures.** Our intel says that one of the rebellion's leaders should be arriving tomorrow. We should be careful about who we use as conduits for our propaganda.
Our adversaries must have noticed the spread of false information, because they've sent a scholar to investigate. They will try to educate the people, be careful not to spread propaganda through people with literacy or your credibility may suffer.	**Rebellion Crumbling.** Your efforts are bearing fruit, the common folk are starting to question what information is true, both from us and our adversaries.
The rebellion's leader must be getting nervous, we are so close to victory. They have many eyes looking out for you now, there is no room for mistakes.	**Leader Uncovered.** With the rebellion in shambles their leader has finally started making a move. Our intel suggests that it is a noble from the royal court, seems they fear the king's growing might.
Their leader has finally shown themself. The only way to end this for good is to take them down directly. Break down both their spirit and reputation so that their opinion no longer holds power among the people.	**Mission Success.** Congratulations, the rebellion has finally crumbled. No one has the will left to oppose the king's rule. You may now return to the questionnaire.

C. Main Game Mechanics

The gameplay revolves around two main sets of mechanics: the playable cards and connections on the board. The card mechanics are quite simple, as they are very standard among other card-based video games as well. These refer simply to the act of drawing, playing, and discarding cards, as well as reshuffling discarded cards back into the deck once the draw pile is empty.

Fig. 5. Screenshot from the 1st level of the game.

The board mechanics, on the other hand, are unique to our game, and have been designed with information sharing as the main focus. Each level has a grid-based board layout with chess-like pawns occupying each grid cell and pointing towards a direction (see Figure 5). Some pawns may have special interactions (further described in section III-D2), but the majority of them will simply point towards a single direction and have no special attributes (as seen in Figure 6). This direction is the core of the game's interactions, as the interactions revolve around using the pawns' directionality to create information chains (the chains are highlighted when hovering over each pawn, as seen in Figure 7).

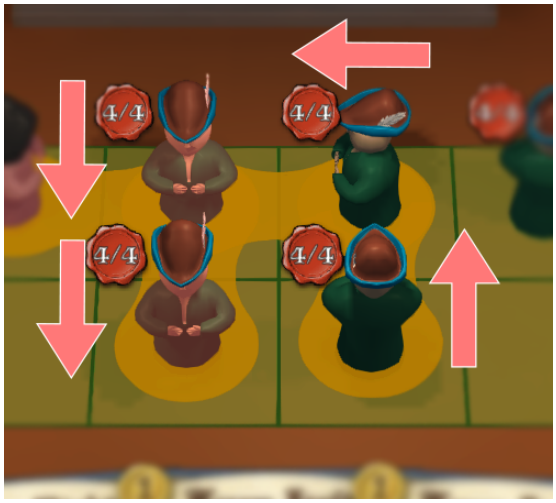

Fig. 6. Screenshot with arrows showing the directionality of the visible pawns.

Chains are created by manipulating the positions and orientations of pawns within the grid, and are used to spread both harmful and helpful information. The player can manipulate the pawns on the grid by playing the cards that they draw each turn. Depending on the type of information being spread and the length of the chains, different player resources are affected.

Fig. 7. Screenshot from the 3rd level of the game, with a highlighted information chain.

1) Resources: The game has two main resources that the player must keep track of and adjust throughout the gameplay. These were designed to reflect the influence of misinformation on the community and the will to rebel, as well as how people's trust may change based on what information they are given. With this, the main resources are:

- **Credibility** - the level of trust the player holds within the community. *Credibility* carries over from each level to the next. In a more traditional game sense, *credibility* is equivalent to the player's health points (HP) - upon reaching 0, the game is lost.
- **Rebellious Spirit** - a shared resource for all pawns in each level, and serves as the benchmark for when a level is complete. The player will try to lower the people's *rebellious spirit* each turn by setting up information chains for *propaganda* to be spread through.

In addition to reflecting some of the potential consequences of spreading misinformation, these two resources also serve the combined purpose of determining when the game is won or lost. As such, the game contains several different mechanics that affect these values.

2) Information Mechanics: Many of the minor mechanics and modifiers in the game are designed to reflect topics related to media literacy and information disorder:

- **Propaganda.** *Propaganda* is the basic type of harmful information in the game. It can be spread by the player through playing cards, and is also spread every turn by the Agent pawn (further described in section III-D2). *Propaganda* is always spread through an information chain. For every person in the *propaganda* chain, their *information capacity* is decreased, and the community's *rebellious spirit* is reduced as well.
- **Information Capacity.** A character's *information capacity* indicates how much *propaganda*, or other harmful information, they can consume before getting *overwhelmed*.
- **Overwhelm.** Once a characters *information capacity* reaches 0, they become *overwhelmed* for 2 turns. An *overwhelmed* character is unable to receive or spread information.
- **Literacy.** *Literacy* is a modifier that can be applied to any pawn in the game. Characters that are literate are more critical of information, so spreading *propaganda* or other harmful information through them decreases the player's *credibility*.
- **Suspicion.** *Suspicion* is another modifier that can be applied to any pawn. It is more difficult to pass information through *suspicious* characters, unless multiple others have already spread the same information. Therefore, any harmful information needs to have passed through multiple people in the chain before reaching the pawn with *suspicion*, otherwise, they will not continue the chain.
- **Counter Information.** *Counter information* is a type of action that special pawns can take. Functionally, it is almost identical to *propaganda*, as it also spreads through a chain and lowers the *information capacity* of characters that it passes through. However, since this information is counteractive to the one spread by the player, it decreases the player's *credibility* instead of the community's *rebellious spirit*.
- **The Truth.** *The Truth* is a special type of information that can only be spread by the player through the card of the same name (see all cards in Appendix A). This represents genuine information, and is the player's only tool for restoring their *credibility*. *The truth* is spread through information chains, but unlike *propaganda*, it instead increases both the player's *credibility* for each pawn it passes through, as well as restores some of each pawns *information capacity*.

D. Game Elements

As described in the previous section, the game contains many different information-based mechanics. All of these mechanics work through either the player's cards, characters on the board, or, for the most part, both.

1) Cards: Among the card types within the game, there are representations for six of the seven types of mis- and disinformation (see Figure 2). The only type not represented is False Connection, as it is necessary for the cards to clearly communicate their function, so a mismatch between the two, as a direct representation of false context, may be too confusing for the player. Each card does not use the term directly, but instead includes text describing the concept. An overview of these six cards can be found in the table below, and a full overview of all cards can be found in Appendix A.

Information Type	**Card Effect**	**Card Description**
Satire or Parody	Remove Literacy	Make a person lower their guard by disguising your message with humor
Misleading Content	Targeted attack	Spread misleading information made to target the reputation of a specific individual
False Context	Remove Suspicion	Lower a person's guard through truthful information but with a contextual spin that benefits you
Imposter Content	Silence a pawn	Spread bad information under the guise of it being from the community leader, temporarily diminishing their ability to affect the community
Manipulated Content	Normal attack	Spread propaganda based on true events, that has been manipulated to show the king in a better light
Fabricated Content	Heavy attack	Spread misleading information made to target the reputation of a specific individual

2) Characters / Pawns: In addition to the players directly spreading information by playing cards, some characters can take special actions based on these same concepts of information sharing:

- **Agent.** A single Agent pawn is present in each level of the game. The Agent serves as the player's main conduit for spreading misinformation, as the Agent spreads *propaganda* at the end of each turn. It is then up to the player to try and control who this information is spread to by managing the connections between the different pawns.
- **Peasant.** Peasants are the standard pawns in the game. They do not have any special actions, and serve the simple purpose of creating information chains based on the direction they are facing on the board.
- **Bard.** The Bard is a special pawn that appears in later levels of the game. It has three special actions it cycles through, focused mainly on changing the positions and rotations of the other pawns. Its role is to force the player to adapt their strategy and make new information chains.
- **Merchant.** The Merchant is a special pawn that appears in later levels of the game. It has four special actions it cycles through, but the main one is spreading *counter information* to damage the player's *credibility*. This encourages the player to not only think about their own information chains, but also the ones they may have set up for the Merchant to use. Additionally, it makes the player focus on maintaining their *credibility* level.
- **Scholar.** The Scholar is a special pawn that appears in the later levels of the game. It has three special actions that it cycles through. The main focus of the Scholar is its ability to apply *literacy* to other pawns.
- **Noble.** The Noble serves as the "final boss" of the game, and works slightly differently compared to the other special pawns. It appears only in the last level of the game, and is presented as the leader of the rebellious uprising. When the Noble is present, the completion objective of the level changes so that the player wins by taking down the Noble, instead of damaging the community's overall *rebellious spirit*.

E. Expert Game Designer Interviews

Partway through the development process for our game, Get Media Savvy put us in contact with two experienced game designers in the industry: Nicholas Fortugno from Playmatics (2023) and Naomi Clark from NYU Game Center (2023).

The two interviews were conducted over online video calls, where the designers had either played the game beforehand or played it as part of the interview. This section focuses on the main takeaways and changes, while the full notes from the two interviews are attached in Appendix B.

1) Interview with Nicholas Fortugno: N. Fortugno's focus was mainly on the logic and puzzle-like design of the game. He provided plenty of feedback and ideas on how to push the base mechanics of the game in new and more exciting ways. He also provided some guidance on the design philosophies of puzzle games, such as ensuring the parsability of the information chains on the board. With the limited gameplay scope of the game prototype for testing this project, we were not able to fully incorporate most of his suggestions on level design (as the prototype was planned for a shorter playtime and only 7 levels). However, we aim to utilize his insights in the future development of the game.

2) Interview with Naomi Clark: N. Clark's feedback mainly concerned the story, and how best to incorporate information disorder to the gameplay experience. Her input for the story progression and difficulty curve was especially insightful. She

suggested building on the concept that the game should be easy until the player starts encountering characters who are media literate enough to see through the *propaganda*.

F. Changes from Feedback

Based on the feedback and suggestions from the game designers, several changes were made to the game:

- **Agent Pawn changes.** The Agent pawn (as described in III-D2) was added to encourage a more varied play style. Before this, *propaganda* could only be spread by playing the appropriate card to manually start the chain. This meant that players would spend a significant amount of time setting up the optimal longest chain first, and only afterwards start spreading *propaganda*. The Agent pawn instead made spreading *propaganda* a more active part of the game, introducing other play patterns than just the longest chain, and added variety as the player then also needed to move around the Agent pawn itself.
- **More Pawn Variety.** In addition to the Agent pawn, more varieties of special pawns were designed and implemented (Bard, Merchant & Scholar). These made the game less repetitive as the player had to account for the different special actions of each character, and allowed more level variety as they could be combined in different ways. Before this, there were only three types of pawns: the Peasant, the Mini-boss, and the Boss (Noble).
- **Chain Visuals.** A visual representation of the information chains had been part of the planned game design already from the early concepts. However, it had not been prioritized for implementation, as we thought the 3D models of the pawns were already set up to display the chain direction well enough. After the game designer interviews, we put more focus on designing and implementing clearer chain visuals. The final chain visual representation can be seen in Figure 7.
- **Story Portrayal of the King.** The original draft of the game's story had the rebellion started by the king's brother in an attempt to overtake the throne. This meant that the player would be the "good guy" in the story. However, we instead changed it so that both the king and by extension player would be portrayed as "bad". Making the player a "villain" in the story felt more fitting for the purpose of portraying the spread of misinformation as a negative phenomenon.

IV. Methods

After implementing the changes from expert feedback, the video game prototype could then be used for the study in an attempt to answer the research question (as defined in the Introduction chapter I):

> *How can a video game increase players' interest in information disorder?*

Based on the research question we formed the following hypotheses:

H0: The video game prototype does not increase players' interest in information disorder.

H1: The video game prototype increases players' interest in information disorder.

To evaluate the players' transformation we followed both within- and between-subjects design focusing on the following variables:

- **Independent variable** – player's exposure to the video game prototype.
- **Dependent variable** – player's interest in information disorder.

A. Participants

The target group was specified as individuals who play video games and use digital media for communication (based on GMS collective's target group described in section II-A). With the target group being broad, we decided to use convenience sampling (Bjørner, 2015) and snowball sampling (Biernacki and Waldorf, 1981) as our main methods for gathering participants. The test participants were reached either in person or through various digital media platforms.

Although our main target group consisted of individuals who play video games, there were 2 participants who noted that they generally do not play games. However, we decided to still include them in the analysis of the results, since upon further discussion with those participants, we discovered that they had only recently stopped playing, but still have experience and general interest in playing video games.

B. Procedure

The study was conducted online, and the participants would complete it in their own time. All participants received a web link, which opened one of two test forms at random, later referred to as groups A and B. Depending on the group the participants were taken through, the procedure followed these steps:

Group A:

- Questions on demographic data
- Video game prototype
- Questions on interest in information disorder-related subjects

Group B:

- Questions on demographic data
- Questions on interest in information disorder-related subjects (later referred to as data set B1)
- Video game prototype
- Questions on interest in information disorder-related subjects (later referred to as data set B2)

Having two questionnaires (further described in section IV-B1) allowed us to triangulate our findings by comparing the effect of the game prototype on interest with the pre-gameplay responses (data set B1) using both within- and between-subjects design. This in turn allowed us to investigate

whether being asked questions before the gameplay impacted the player's attitude after the playthrough.

1) Questionnaire: When constructing our questionnaire, we took inspiration from other tests conducted on similar topics. The main studies were: an evaluation of the America 2049 game, by Diamond and Brunner (2011) (shared with us through Get Media Savvy), and the New Media Literacy Scale (NMLS) by Koc and Barut (2016). Of these, the evaluation of America 2049 focuses on making the players reconsider their view of various social issues; while the NMLS focuses on the evaluation of participants' usage & knowledge of media and its impacts. As our game prototype aims to showcase the way misinformation can spread, and how it might affect people and communities, we decided to base our questionnaire on the NMLS.

Since NMLS focuses on usage & knowledge of media, we had to take additional steps to make a list of questions that would fit our study's purpose:

1) *Question Selection*
   First, we selected the questions with topics that matched our game and fit with the ideas and values carried by GMS. We mainly filtered questions that related specifically to people's ability to use media for communication. This left us with 14 out of the original 34 questions.
2) *Reformulation*
   With 14 base questions from the NMLS selected, we then reformulated them. This process focused on keeping the main focus of each question, but changing the wording to specify their interest in certain topics, instead of their knowledge. Additionally, some questions that originally covered multiple different aspects of media were split into separate questions for each one, as a person may show interest in one topic, but not in others. With this, we ended up with a total of 16 questions.

Additionally, our questionnaire was formatted to follow a similar structure to the NMLS (Koc and Barut, 2016). This meant that each Likert item had 5 answer options ranging from "Strongly disagree" to "Strongly agree". Furthermore, the questionnaire was set up so that the 16 questions were presented in a random order, ensuring that there would be no potential consistent bias based on question association. The full version of the final questionnaire, including demographic questions and instructions, can be found in Appendix D.

2) Pilot Test: The pilot test was conducted in person on five people sampled based on convenience. During this testing, we gathered valuable feedback on both the game prototype and the test procedure. The participants were instructed to follow the test procedure with little to no interference from the test conductors, while the conductors took observation notes as well as held a discussion after the procedure. Based on the pilot test feedback, the following changes were made to the game:

- Changed text on the victory (game completion) screen to direct people to the questionnaire to make the procedure more streamlined.
- Added an information box in the last level with an explanation of the level's change in objective. This was previously overlooked by some participants, which caused confusion with the final level's goals.
- Informative in-game tooltips were adjusted to become more user-friendly and less intrusive during gameplay.
- Lowered the final goal (*rebellious spirit*) threshold for levels 3-6, to make the overall playtime shorter for the test procedure.
- Re-ordered the list of special actions for some of the special characters (the Merchant and Scholar pawns), so they perform their signature actions first and make the encounters a bit more unique.
- Added more text explaining the functionality of the Agent character on the opening screen in the game, as the Agent was previously overlooked as a targeted enemy character, rather than a supporting allied character.
- Made the draw and discard piles visible to the player, as this was the expected functionality of card games.

Additionally, the following changes to the test procedure were made:

- Re-worded several questions that had ambiguous meanings.
- Added explanations and/or definitions for most of the questions.
- Added a definition of "media" to the questionnaire, based on the explanation used in the New Media Literacy Scale (Koc and Barut, 2016).

All of these changes were made to mitigate any confusion observed from the participants during the pilot testing, and the questionnaire changes were made to minimize ambiguity and misinterpretation of the various questions. The changes were done both based on direct feedback from the participants and in-person observations by the test conductors.

C. Data Analysis

As described in the procedure section IV-B, the test participants followed the procedure for either group A or B. With group B answering the same questionnaire twice, the three data sets were:

- **A:** post-gameplay answers from group A.
- **B1:** pre-gameplay answers from group B.
- **B2:** post-gameplay answers from group B.

For the main data analysis, a comparison was done between data sets A and B1 following between-subjects design model. Here, B1 served as the control data, while A was the test data (the first experiment is described in section V-B). The second analysis instead compared B1 and B2, with B1 serving as control data, and B2 serving as the test data (the second experiment is described in section V-C), following within-subjects design model. These two analyses were done to help triangulate the data, by doing both a within- and between-subjects comparison.

In addition to these two analyses, both of which aimed to test the **H0** hypothesis, a Cronbach's alpha test was performed to evaluate the questionnaire's internal consistency.

V. Findings

Data was collected from 110 participants. Some of it had to be discarded due to one or more of the following reasons:

1) Participants did not play the game at all or finished only up to level 3 (the full game had 7 levels).
2) Participants were under the age of 16.

Two other responses had to be filtered out manually due to a high suspicion of dishonest answers. In the end, valid questionnaire data was gathered from 88 participants.

The main findings were split into Experiment 1 and Experiment 2 based on the data sets that were compared. However, first, an analysis was done on the internal consistency of the questionnaire items to indicate how the data should be treated for further analysis.

A. Likert Item Consistency

The questionnaire formulated for this study consisted of a collection of Likert items (the full questionnaire is attached in Appendix D). To evaluate if these Likert items could form a consistent Likert scale, Cronbach's alpha value was calculated.

1) Gathered Data: Data for the Likert scale internal consistency was used from participants from the B1 (only pre-gameplay questionnaire) and A (only post-gameplay questionnaire) data sets. These groups were taken as it was important that participants had the same level of familiarity with the questionnaire - the first time they filled out the same questionnaire. Therefore, answers to 16 Likert items from 88 participants were considered for this analysis.

2) Results: The 16-item questionnaire used for the study had a Cronbach's alpha value (α = 0.862) that indicated good internal consistency of Likert items (George and Mallery, 2003). For additional analysis, Cronbach's alpha value of the scale was also calculated after removing each of the items/questions separately:

Removed Question	α
Q1	0.849
Q2	0.863
Q3	0.858
Q4	0.852
Q5	0.851
Q6	0.851
Q7	0.852
Q8	0.852
Q9	0.849
Q10	0.850
Q11	0.847
Q12	0.856
Q13	0.849
Q14	0.852
Q15	0.865
Q16	0.865

A high Cronbach's alpha value indicated that the Likert items could form an internally consistent scale. Although individual Likert item scores were still treated as ordinal data, the internal consistency of the scale allowed getting a general score for each participant by summing up their answer scores. Based on the alpha value and recommendations from our supervisor, we chose to treat the summed data as interval data. This treatment was also based on the assumption that with an internally-consistent Likert scale, the uncertainty that makes individual items ordinal, would vastly even out, thus producing interval data when summed up.

B. Experiment 1

For Experiment 1, participant data from data set B1 (only pre-gameplay questionnaire) and data set A (only post-gameplay questionnaire) were compared. The responses to the questionnaires were treated as interval data (as explained in section V-A). Each participant's score was determined by taking the average of their questionnaire responses.

1) Gathered Data: For this analysis, data was used from 88 participants (44 per group). There were 69 males, 13 females, 3 non-binary, and 3 participants that noted their gender as other. Their ages varied from 16 to 52 years old (M = 24.329, SD = 7.717), with the majority residing in Denmark (N = 36), Poland (N = 31) and the United States (N = 6). Most participants indicated that they consume social media content more than once a day (N = 74), and post/contribute to social media less than once a month (N = 42). There were two distinct groups for video game habits: participants mostly indicated that, on average, they play video games at least 4-7 hours per week (N = 24), or 16 or more hours per week (N = 19). The complete Experiment 1 participants' demographic data (nationalities, media consumption, media contribution, and gaming habits) is attached in Appendix E-A.

2) Results: Descriptive statistics were performed on the participants' scores:

Data Set	Mean	Standard Deviation
B1	3.341	0.617
A	3.548	0.589

Additional figures were created to illustrate the gathered data for Experiment 1:

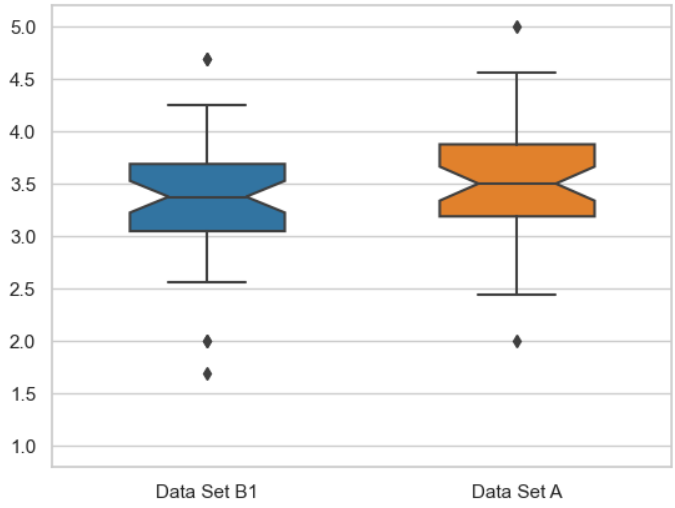

Fig. 8. Boxplots for data sets B1 & A.

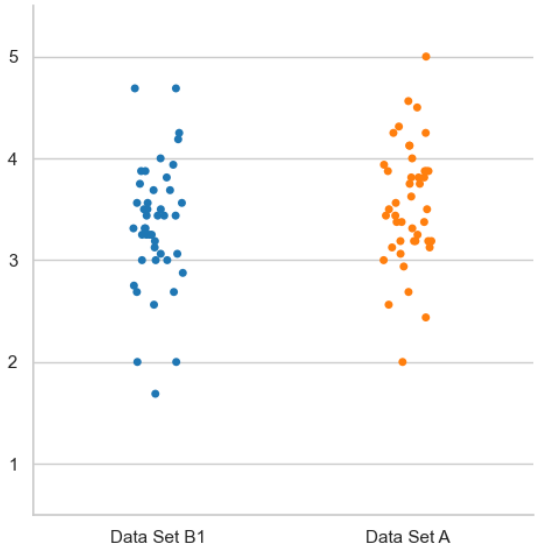

Fig. 9. Scatterplots for data sets B1 & A.

Shapiro-Wilk test for normality indicated that data from data set B1 (W = 0.965, p = 0.202) and data set A (W = 0.988, p = 0.927) were normally distributed. When looking for homogeneity of variances, Levene's test indicated that data sets B1 and A (F = 0.018, p = 0.892) had equal variances.

The data from Experiment 1 fulfilled the requirements for a parametric test (the data was treated as interval, normally distributed, with the same variance for both groups). Looking for positive change, a one-tailed independent two-sample T-test was performed ($t(86)$ = -1.613, p = 0.945, d = 0.344), indicating that participants' questionnaire scores from data set A were not significantly higher than participants' questionnaire scores from data set B1. The effect size of Experiment 1 (d = 0.344) corresponded to a small-medium effect (between 0.20 and 0.50) (Sawilowsky, 2009).

C. Experiment 2

For Experiment 2, participant data from data set B1 (only pre-gameplay questionnaire) and data set B2 (only post-gameplay questionnaire) were compared. The responses to the questionnaires were treated as interval data (as explained in section V-A). Each participant's score was determined by taking the average of their questionnaire responses.

1) Gathered Data: For this analysis, data was used from 44 participants. There were 34 males, 8 females, 1 non-binary, and 1 participant that noted their gender as other. Their ages varied from 16 to 52 years old (M = 24.364, SD = 7.339), with the majority residing in Denmark (N = 21), Poland (N = 14) and the United States (N = 4). Most participants indicated that they consume social media content more than once a day (N = 36), and post/contribute to social media less than once a month (N = 20). There were again two distinct groups for video game habits: participants mostly indicated that, on average, they play video games at least 4-7 hours per week (N = 12), or 16 or more hours per week (N = 10). The complete Experiment 2 participants' demographic data (nationalities, media consumption, media contribution, and gaming habits) is attached in Appendix E-B.

2) Results: Descriptive statistics were performed on the participants' scores:

Data Set	Mean	Standard Deviation
B1	3.341	0.617
B2	3.367	0.797

Additional figures were created to illustrate the gathered data for Experiment 2:

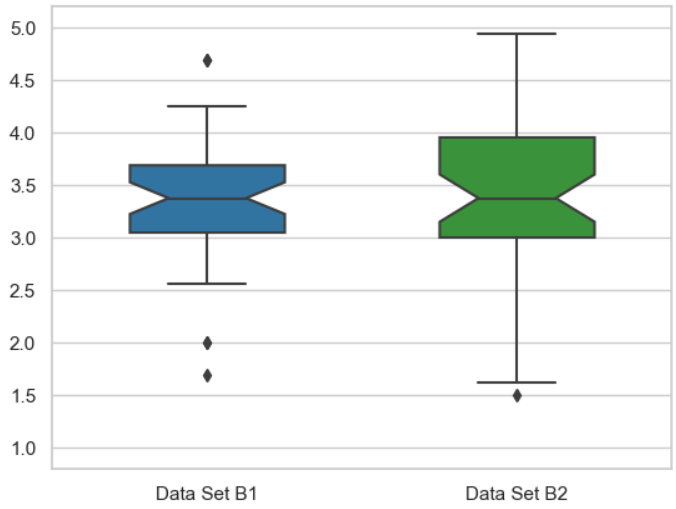

Fig. 10. Boxplots for data sets B1 & B2.

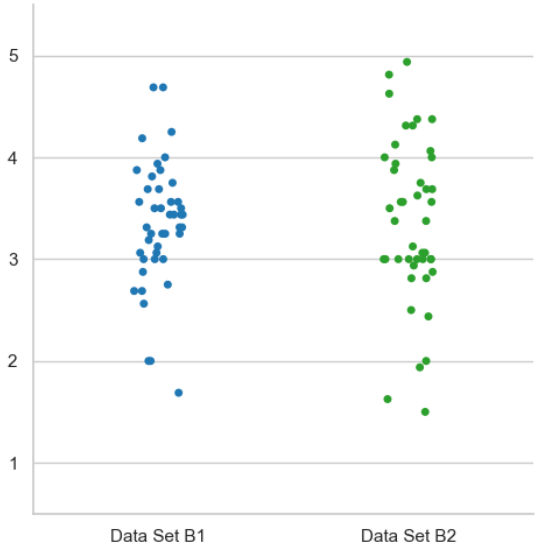

Fig. 11. Scatterplots for data sets B1 & B2.

Shapiro-Wilk test for normality indicated that data from data set B1 (W = 0.965, p = 0.202) and data set B2 (W = 0.972, p = 0.367) were normally distributed. When looking for homogeneity of variances, Levene's test indicated that data sets B1 and B2 (F = 3.885, p = 0.052) had equal variances.

The data from Experiment 2 fulfilled the requirements for a parametric test (the data was treated as interval, normally distributed, with the same variance for both groups). Looking for positive change, a one-tailed paired sample T-test was performed ($t(43)$ = -0.388, p = 0.65, d = 0.036), indicating that participants' questionnaire scores from data set B2 were not significantly higher than participants' questionnaire scores from data set B1. The effect size of Experiment 2 (d = 0.036) corresponded to a (very) small effect (between 0.01 and 0.20) (Sawilowsky, 2009).

VI. Discussion

This chapter describes discussions on the experiment findings, what aspects may have influenced them, and what conclusions may be drawn from the findings. Additionally, it covers topics related to the general feedback and observations gathered during the testing procedure, as well as essential points for any potential future studies on this topic.

A. Result Discussion

As explained in the Methods chapter (IV), data was collected using convenience and snowball sampling, with participants split into groups A and B. Furthermore, as described in the Findings chapter (V), the collected data was analyzed in two experiments comparing before and after data following both within- and between-subjects design. This section discusses the results of said analysis.

1) Findings: Despite the sufficient internal consistency of the Likert scale, no significant difference was found in either of the two experiments (see V-B and V-C). As a result, the **H0**:

The video game prototype does not increase players' interest in information disorder.

could not be rejected. Considering the effect size in Experiment 1 was medium to small, and in Experiment 2 it was (very) small, in the future, a test with a larger sample would be needed to get more accurate results. There were several other potential reasons for the inconclusive results:

1) The experiment may not have been long enough for the participants to experience change.
2) The game was not explicit enough to convey the information disorder message.
3) The Likert scale did not accurately measure interest.
4) The questions were too vague, resulting in people choosing the most neutral answer.

Addressing these points would require a future study to test the scale using a different game or another form of media to verify whether the issues lie with the game prototype or our Likert scale. The first point, regarding the experiment length, is addressed more in-depth in section VI-A3. Similarly, the second point regarding the explicitness of the game is elaborated on in section VI-A4. The third point regarding the difficulty of measuring interest is discussed further in section VI-A2. Lastly, the fourth point, regarding the Likert scale, is expanded upon in section VI-B1.

2) Measuring Interest: The focus on the interest aspect for this study was based on suggestions from our collaborator Get Media Savvy (as described in section II-A), with the overall intent that some players may then be inspired to do more research on information disorder and media literacy.

However, interest can be difficult to measure, as it is not easily quantifiable. Additionally, short-term interest can be

highly variable as it may fluctuate with a person's mood, and can be influenced by current events. This is especially relevant to the topic of social media, where people's interests may be dependent on what other people and/or events they follow.

A future study on this topic may benefit from instead being conducted in a longitudinal manner. This way, the study could have a greater focus on the desired behavioral change of how participants interact with and/or think about media content.

3) Exposure Time: For this experiment, most participants played the game prototype for about 30 minutes. However, it may be hard to instill a lasting interest in a short period of time. The prototype had to be kept relatively short in order to retain participants' attention, minimize decision fatigue, and potentially help gather more participants due to a shorter procedure length accounting for the participants' limited time. As a result, participants may not have had a lot of time to think about the message and context of the game, as they were instead focused on learning how to play. This may have been a factor as to why the results showed no significant change in participants' interest in information disorder.

Additionally, the game prototype was designed to present the concepts of information disorder through a medieval context. As a result, there was a level of abstraction between the game and how most participants would have experienced information disorder in modern media. This abstraction means that players may have benefited from more prolonged exposure to the game, allowing them a chance to immerse themselves more in the story world and to reflect on it. Reflection may have been beneficial in helping bridge the gap of abstraction. A suggestion for future studies may be to conduct tests with several participants at the same time and give them the opportunity to discuss the game in small groups to encourage reflection.

4) Information Through Text: Based on conversations with some of the participants after the test procedure, we realized that several of them had been skipping most of the in-game narrative text while playing. The game's mechanics and resources were designed around concepts related to information disorder, so some of the potential influence on the players' interest should be independent of the in-game text. However, detailed information about the effects of different types of information and changes in the society of the story world was presented through text. This text was presented before and after each level (described in section III-B), as well as in the descriptive text on the cards (attached in Appendix A). Most participants specifically expressed that they did not fully read the pieces of text presented before and after each level. These pieces of text mainly describe the progression of the narrative and provide context for the story world. This means that those players may have missed the progression of the story, and with it, the effect of the player's spread of misinformation on the community. Thus, this tendency in player behavior may have limited the potential effectiveness of the game in increasing their interest in information disorder.

Future development of the game should then focus on making the text more interesting, or try presenting the same information in other ways. There is also the option for future testing to specify in the testing instructions that the participants should pay attention to the in-game text. However, directing the players outside of the game might bias them during the playthrough and interfere with their regular or natural game behavior/approach.

The best way to influence players to understand the narrative context would be for them to receive this information organically through gameplay or visuals. Additionally, the game's narrative could also be more interactive, allowing the player to choose between different story paths. This would give the player more agency over the story, and potentially make them more engaged in the narrative.

B. Validity and Reliability

1) Modified Questionnaire: The questionnaire used for testing was designed inspired by the New Media Literacy Scale (as described in section IV-B1). However, as our collection of Likert items was newly constructed, and had therefore not been used or otherwise verified in previous studies, we could not know the true validity of it. The analysis showed that the questionnaire had a high level of internal consistency, thus allowing us to consider it a Likert scale, and instilling confidence in its ability to produce reliable data (see section V-A).

However, from manual observation of the questionnaire data, it seemed that this level of internal consistency came from the fact that most responses had a tendency towards indifference. Meaning that the majority of respondents chose the middle (neutral) answer option for most of the questions. This could be the result of the game prototype not having an effect on people's interest. Yet, this may also be an indication that the questions were not properly phrased to measure the participants' interest.

To further validate the Likert scale, more tests should be conducted. A potential suggestion for said testing could be to change the Likert items to instead have an even number of answer options, thus removing the possibility for a neutral option, and instead having the participants more actively evaluate their level of interest.

2) Measuring Biases: The majority of test participants were found using convenience sampling of people in the vicinity (as described in section IV-A). As such, there was a risk of social desirability bias, wherein the participants may have given what they believed to be more favorable or desirable answers rather than their true answers (Schwarz et al., 1991). In this study's context, the participants may have felt inclined to give more favorable answers as many of them knew one or more of the test conductors personally. If this bias was present, it should only be observable in data set B2, as the participant may have remembered their answers from B1, and then actively chosen different answers for B2. Although there was no significant

difference, the data showed a lower effect size in Experiment 2 (comparing data sets B1 and B2) compared to Experiment 1 (comparing data sets B1 and A). Thus, it would not appear that such bias had any effect on the results.

3) Online Procedure: The entire testing procedure for this study was performed fully online. This does brings some potential concerns. For instance, some participants may not have completed the entire test in one sitting, thus allowing time for them to lose some of the game's narrative cohesion or immediate impact of the gameplay before the post-gameplay survey. Another factor for this is that the online procedure may have allowed the participants to be influenced by outside factors, such as their own usage of media for communication throughout the test. Furthermore, the main issue that was observed with the lack of direct control over the testing procedure, was that several participants did not complete enough levels of the game, or did not complete any levels at all in some cases. In such cases, their data could not be used for the statistical analysis (as described in chapter V).

On the other hand, online testing also had several benefits. A clear advantage of online testing was easier distribution and accessibility, as the participants could choose a convenient time to perform the test procedure. It also allowed to reach more participants from various countries. The main benefit, however, was that the online format of the test was much closer to the natural setting for a game to be played, thus adding to the validity of the testing.

C. Future Work

1) Qualitative Feedback on the Game: As part of the final test, qualitative feedback on the game prototype was also gathered. This feedback gave an insight into any potential issues with the prototype, as well the most enjoyable aspects of the game. From this, several points stood out as guidelines for any future development of the game, to make it better both for the purpose of portraying information disorder, as well as to improve the gameplay experience. The following responses encompass the main suggestions from the feedback:

> *"The game was very cute, but it could have been beneficial with some additional instructions in the beginning, because it was unclear what the aim of the game was."*

> *"I had trouble figuring out the left and right turning, even though I read the description on the cards, I still found myself clicking on the wrong card."*

The most prevalent feedback concerned the need for a more informative introduction to the gameplay and mechanics. A tutorial level had always been planned for the game, though this was not within the limited scope of the prototype for this study. However, the collected feedback has highlighted the main points of confusion, and will be helpful when designing said tutorial.

Other than pointing out points of confusion, the rest of the feedback consisted almost entirely of expressions of enjoyment for the game, and people looking forward to the possibility of further development:

> *"I loved the concept of the game, and the execution was great! (Art and ambiance were on point)"*

> *"Fun game with a good format once you get used to it"*

> *"Very engaged in the game and it's puzzle aspect. Would enjoy playing more of it, especially if there were a way to user-generate challenges, like choosing what cards you have available, the objective (single target or propaganda up), the map shape/size, and where pawns go"*

CONCLUSION

With the rising use of social media and other digital platforms as sources of information and news, it has become increasingly relevant for people to be aware of information disorder, its effects, and how to counteract it. This paper set out to investigate whether playing a game, developed around the concepts and consequences of information disorder, could increase players' interest in the topic. Research was performed on information disorder, as well as media literacy strategies to counteract it. Additional research investigated how transformational games could be used to affect people's views and interests. Based on this analysis, we developed a game prototype of a strategy deckbuilder game. The game was used as a tool to help answer the research question:

> *How can a video game increase players' interest in information disorder?*

An experiment was conducted on a total of 88 participants, split between two conditions, producing three data sets. Three results analyses were performed, first evaluating the internal consistency of the developed questionnaire, concluding that the collection of Likert items could be considered as a Likert scale. The other two were statistical analyses aimed to triangulate the findings by comparing data from before and after gameplay following both within- and between-subjects design.

The results did not show a significant increase in participants' interest in information disorder after playing through the game. However, further testing should be done on the Likert scale to verify it as a proper measuring tool. Additionally, we suggest that future studies based on interest in the topic might benefit from more longitudinal procedures. However, the game was well-received, and we hope to use these findings to further develop the prototype as part of our continued collaboration between Enlit Games and Get Media Savvy.

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APPENDIX A
CARD OVERVIEW

The following two pages contain a full overview of all the cards implemented in the game.

2 **Turn Around**

Rotate a pawn 180°

Change who a person shares information with/trusts information from

1 **Turn Right**

Rotate a pawn 90° clockwise

Change who a person shares information with/trusts information from

1 **Turn Left**

Rotate a pawn 90° counter clockwise

Change who a person shares information with/trusts information from

2 **Rumor Swap**

Swap the positions of 2 adjacent pawns

Spread targeted rumors to affect people's positions within the community

3 **Reorganize**

Swap positions of any 2 pawns

Spread targeted rumors to affect people's positions within the community

3 **The Truth**

Heal pawns in a chain and increase credibility for each one

Restore the people's trust in you by spreading genuine information

2 **Satire**

Remove literacy from a pawn

Make a person lower their guard by disguising your message with humor

1 **False Context**

Remove suspicion from a pawn

Lower a person's guard through truthful information but with a contextual spin that benefits you

3 **Lower Guard**

Remove both suspicion and literacy from a pawn

Lowering a person's guard by sharing genuine information that is damaging to the rebellious cause


2
Calm Down
Make a pawn recover from being overwhelmed
Help a person recover from information overload
2
Ostracize
Remove a pawn, leaving an empty space
Spread targeted rumors to ostracize a single person from the community
3
Recruit
Add a new pawn to an empty space
Indoctrinate a new person into the community to establish new information chains
2
Propaganda
Chain attack enemies for 1 damage each
Spread propaganda based on true events, that has been manipulated to show the King in a better light
3
Take Down
Start a chain that deals damage to to the last pawn based on the length of the chain
Spread misleading information made to target the reputation of a specific individual
4
Tall Tale
Start a chain that deals 2 damage to each pawn but applies literacy.
Spread fully made up propaganda portraying the King as a hero, greatly lowering the community's rebellious spirit, but making them more critical of future information

APPENDIX B
DESIGN INTERVIEW NOTES

The following two sections contain the notes taken during the design interviews with Nick Fortugno and Naomi Clark.

Nicholas Fortugno

Nick's initial reaction is that the basic idea makes sense - creating chains of people, and there is nothing inherently wrong with the main mechanic, although we can work on more unique ways to present it.

Nick brought up an example of ChuChu Rocket! That game works with a simple gameplay loop (set up arrows where mice are, and keep the line going), though the challenge is that you can't constantly maintain your line because other people affect this and disrupt your lines. Applying this example to Web of Lies, the longest chain is what you want to always achieve, although there should be obstacles that disrupt the longest chains. The things on the board have to cause the player to behave in a different way, as they should affect the chain.

Core mechanics are interesting, though we could include a variety of obstacles preventing you from getting to your final objective (making the longest chain) as it can help to make the game more fun and engaging.

Potentially create more chaos (changing shape of the board).

Consider how chaining could be more interesting. Can there be pieces that chain in a non-obvious way? (e.g. affect pieces of the same color, a stopper piece that gets exhausted instantly once it gets hit, a reflector that hits the player back, or a piece causes everything to flip/rotate once it gets hit) - maybe a different "puzzle" (approach) for each level.

Include level variety, each time you come to a level you would want to be curious about how to solve this specific level. Now, we are not pushing the main mechanic enough, we are mostly making the player focus on making the long chain. If that is the case all the time, then the game can get a bit stale.

Include smaller objectives.

Consider different ways to set the board up, and different things that can affect your mechanics and approach to the board.

Focus on a variety of actions and a variety of goals in mind. What am I supposed to do in this level? We can lean into our cards more for this.

Make the board parsable: the board needs to clearly indicate at all times what the player's condition on the board is.

Pipe Mania example - it's a parsable board, because it's easily scannable when you focus on the connected lines/pipes. You don't process the board as individual squares, and you have higher level processing that the board is lines, and zoom in/focus where the lines break.

Each level should be an interesting different expression of our main mechanic. Teaching something new, or introducing harder version of a boss, etc. That becomes more fun and interesting. Some specific examples from our game to consider:

Maybe we don't need propaganda (attack) cards, and that attacks happen automatically after each turn. Damage cards would be just bonus damage or extra damage - some special attacks on top of the regular one.

One of the characters on the board could be the one feeding propaganda? This could be included in at least some of the levels - the person that you always need to start the chain from.

Naomi Clark

She played the game prior to the meeting.

Thinks it's smart that we are using medieval setting as opposed to something more modern/realistic.

Brought up a study showing that fictional setting makes bigger impact than a realistic one.

She agrees with the planned improvements we have for the game.

Brought up McDonalds game and Oil industry game as games successful at making player the villain. But also thinks it's tricky to make players get attached or understand why they should care about being the villain.

What does it mean to be someone who's suppressing kings rebellion? There's possibility of a grey area but it should be clear that you're the bad guy. Find pleasure in being the bad guy like in Monopoly (fantasy of being bad landlord)

The story could make players care, but also we don't have to justify the actions of the villain.

According to Naomi currently most important card are the damage cards.

She lost the 3rd encounter a few times. Found the mini-boss challenging.

Challenges:

Game is random, pawn orientations feel random, how long of a chain you can get also feels random. What cards you get is also very random.

Possible improvements:

Over the course of the game make the game more stable and tactical and less random, give players more control.

Introduce more powerful cards, give players the option to remove cards, add more draw cards. Maybe mix in cards that give extra actions.

Give players more breathing room.

We don't have to rely on making the game skill driven because of the story behind it. We can make the game more approachable as opposed to making it a heavy on strategy.

Joker mechanically makes sense but story wise it might be too powerful at the start/introduce too much chaos.

Introduce rebellion as a way to counter the misinformation. With the story progression start introducing more literate characters and make them extra hard to defeat to show people that literacy is a powerful tool against misinformation.

Proof concept: Passed

Treat level design as a story: Act 1: No one can stop me. Act 2: Oh no now the good guys are here to defeat me – the real challenge starts.

APPENDIX C
GAME DESIGN DOCUMENT

The following pages contain the full PDF for our game design document.

This document was written for the intended purpose of outlining the design for a full scaled game, so some of the described mechanics or game structures may not be implemented in the prototype used for this project.

Web of Lies

Game Design Document

GMS x Enlit Games

Gossip in the community. Spymaster in the window.

Tip: use document outline for table of contents

Overview

The player takes the role of a spymaster hired by the king to dismantle a rebellion by distributing different types of mis- & disinformation to people, spreading propaganda among the populace. They must balance between giving them manipulative information, and maintaining credibility within the community.

Genre: Singleplayer roguelite deck builder

Media Literacy Goal

The goal of this project is to give players an intuitive understanding of how mis- & disinformation spreads. When most social platforms are engineered for people to publicly ‘perform’ through likes, comments or shares, it’s easy to understand why emotional content travels so quickly and widely, even as we see an explosion in fact-checking and debunking organizations. With an abundance of information, it can be difficult to spend time fact-checking every source of information, to the point where a lot of users lack skepticism. The game aims to showcase the manipulative power of widely spread mis- & disinformation, when people take in information without questioning the intent behind it or checking the legitimacy.

GMS Keywords

Mis-information	When false information is shared, but no harm is meant
Dis-information	When false information is knowingly shared to cause harm
Mal-information	When genuine information is shared to cause harm, often by moving information designed to stay private into the public sphere.
Information overload	A situation in which you receive too much information at one time and cannot think about it in a clear way
Rumor	Information or a story that is passed from person to person but has not been proven to be true
Propaganda	Information, ideas or rumors deliberately spread widely to help or harm a person, group, movement, institution or nation. It is often biased and misleading, in order to promote an ideology or point of view
Spin	To present news or information in a way that creates a favorable impression
Credibility	The quality or state of being credible; capacity to be believed or believed in
Satire / Parody	False or partially false information shared with the intent of being entertaining or comedic. Might not be intended to cause harm but can risk fooling people
False connection	When the headlines, visuals or captions don’t support the actual content. Though the actual content might have genuine information, the headline or similar might result in false conclusions.
Misleading content	Misleading use of information to frame an issue or individual. This information is usually spread to harm the status of or manipulate the public opinion about a specific target.

False context	When genuine content is shared with false contextual information. The use of genuine information is used to lower the guard of skeptics and make the false information seem more believable.
Imposter content	When genuine sources are impersonated. By utilizing people's trust in an information outlet, like a trusted individual or news company, people frame information as having been shared by them to reach a wider audience or to make the false information seem genuine.
Manipulated content	When genuine information or imagery is manipulated to deceive. Withholding or slightly changing details of the information to change the overall message.
Fabricated content	New content that is 100% false, designed to deceive and do harm.

Informing Elements

Social media platforms:

- Twitter, Instagram, Discord, Reddit, Youtube, 4Chan Tik Tok & Facebook are perfect environments to spread various unfiltered information. On these sites information is presented at such a fast pace, there is no way to make sure the information is correct.

Game Mechanics

Resources

MACRO	Credibility	(HP) - you gain or lose credibility depending on the types of information you spread
	Gold	(Mana) - you have a certain amount available each turn, which is used to play different cards
	Deck of Cards	different messages of mis- & disinformation that you can pull from the deck while playing
micro	Cards in hand	single pieces of information that you spread or single actions that you take to affect the

		community
	Rebellious spirit	A measurement of the community or community leaders' intent to rebel. If their spirit is fully reduced they get dissuaded from rebelling
	Information capacity	A single person in the community can only handle sharing a limited amount of information in a short time. If their capacity is reached they get information overload and will retreat

Active mechanics

- Rotation - rotating a Pawn(in either direction) to change its directional connection so it now spreads information with a different neighboring Pawn.
- Swapping - swaps the grid positions of two Pawns while maintaining their current rotation. Can also be used to move a Pawn to an empty grid position.
- Spread harmful information - starting a chain of harmful information from a single Pawn, which then travels along each Pawn's directional connection.
- Shunning - when a Pawn gets shunned it is removed from the grid leaving its previous space empty.
- Inviting - if there is an empty space in the grid a new random Pawn can be invited in to take up that space.
- Collecting rumors - adding new cards to your deck
- Changing Pawn attributes - add, remove or change which attributes are currently in effect for the individual pawns

Passive mechanics

- Grid - the board is a grid with set dimensions and amount of spaces. Each space in the grid may be either empty or occupied by a single Pawn.
- Deck re-shuffling - as cards are drawn from the deck and either played or discarded, they are added to the discard pile. If there are not enough cards remaining in the deck to draw a full hand of cards you draw the remaining cards in the deck, then the discard is immediately re-shuffled into your deck, and you draw the remaining amount up to a full hand of cards.

NPC attributes

- Directional connection - an indication of what neighboring Pawn(s) a given Pawn will spread information to.
- Information capacity (pawn HP) - once hp drops to 0, the Pawn is overwhelmed and cannot take in or spread any information for a turn.
- Special abilities - some Pawns have abilities that use the Active mechanics to hurt your credibility and reinforce the community.
- Literacy (thorns) - if harmful information is spread through a literate Pawn it will damage your credibility.
- Suspicion (block) - a suspicious Pawn is harder to spread information through and can't be affected directly.
- Community leader - If a community leader Pawn is present, then the community's rebellious spirit can only be lowered by spreading harmful information directly to the community leader Pawn.

Card attributes

- Cost - how much gold do you need to pay to play the card.
- Board effect - which active mechanic action will the card let you perform (ie. rotate a Pawn clockwise, or start a chain of harmful information).
- Resource - a card may increase or decrease a specific resource (credibility etc.).

Gameplay Loop

Structure elements:

- Run - a single playthrough of all the game's stages, or until the player loses the game.
- Stage (week) - the game progression is split into several stages with a community leader encounter at the end of each. Each stage consists of 7 encounters (days in a week based structure).
- Encounter (day) - each day is a new encounter. An encounter is a single field of Pawn with a rebellious spirit that you need to decrease. A given encounter may

have different challenge goals, indicating how you can lower the board's rebellious spirit.

- Information gathering - after each encounter gets to gather information by adding a new card to their deck. The available cards are randomly chosen from the total pool of possible cards.
- Visit - on specific days of the week special characters will visit after your information gathering. Each guest offers a different service:
    - Counter intelligence - remove cards from your deck
    - Buy information - use gold to add more cards to your deck
    - Special challenges - accept special challenges for the next encounter that will either reward or punish you based on whether or not you succeed in completing the challenge.
- Turn - an encounter is played out as a sequence of turns. Each turn has several stages:
    - Draw - the player draws a full hand of cards. The deck is re-shuffled if necessary.
    - Play - the player gets to play cards until they run out of action points or cards to play, or decides to end their turn. Playing a card happens in steps:
        - A card is selected
        - A target (if needed) is selected
        - Action points are paid equal to the card cost
        - The card effect happens
        - The card is discarded
        - Any resource changes take effect
    - Pawn actions - if any Pawns on the board have actions, then those actions take effect.
    - Restoration - any Pawns that were overloaded the previous turn are restored.

Encounter

You spread information to Pawns (NPCs), and then they spread messages between themselves based on the directions of their connections.

Information spreads in chains following the directional connection of each Pawn until it reaches a boss, the edge of the grid, and empty grid space, or would be spread to a Pawn that has already been part of the chain.

Game is played in turns, where the community tries to fight back against the spread of mis-information.

Get new cards as you play. Use your coins to spread different types of mis- & disinformation (cards) to change the positions and directional connections between the pawns. And spread harmful information to damage the community's rebellious spirit.

Run

The game is split into runs. Each run is an attempt to dismantle a rebellion by a new spy sent by the king.

A new deck is built every run as the spy gathers more information/gossip about the community.

The run starts with a basic deck of cards/messages gathered by the spy about the community. After each encounter, the player gets to add 1 card, from a random selection to their deck. The pool of available cards gradually becomes better/stronger.

During an encounter, the player goes through turns where the player chooses cards to play, after which the Pawns on the board get a turn of their own. This continues back and forth until the player either depletes the encounter's rebellious spirit(HP) and gets to progress, or has their credibility depleted, in which case they lose the game.

Each encounter represents a day within the week that makes up each stage in the game. On certain days of the week, different special guests will visit. At the end of each week, a community leader will come by, serving as the boss for the final encounter of that stage, and you have to dismantle their rebellious spirit in order to proceed to the next stage.

Meta Progression

___

__

____

Storyworld

The game follows a medieval fantasy setting.

The king is struggling to keep the people united under him, and a rebellion is on the rise out and about in the towns and cities of the kingdom.

You are a spymaster sent by the king to dismantle this rebellion. To accomplish this you go undercover as a barkeep, listening in on rumors and spreading dis-information and propaganda among the patrons, slowly breaking down the people's rebellious spirit. As the rebellious spirit of the people dwindles, community leaders will show up trying to restore their resolve, and so you will need to break their spirit as well.

Art Direction

- Medieval setting
- Designs inspired by old filigree.
- Sound design is relaxed, but gets tenser if your credibility lowers. And different tones are mixed in depending on the unity of the community you are currently facing, and the cards you are playing.

- High-pitch jovial-like fiddle/violin music whenever pawns are outcasted or long information chains are made.
- The tone should shift between optimistic and downtrodden depending on how well the community is doing.

Mood Board

Tech Spec

PC, Steam.

There is potential for the game to be ported to mobile and consoles.

Because the game is a single-player experience, there is no need for servers or databases.

The game would be developed in the Unity game engine.

APPENDIX D
QUESTIONNAIRE

The following 9 pages contain the entire list of questions and information given for condition A during final testing.

The main difference between condition A compared to B1 & B2 is that conditions B1 & B2 additionally had the same questionnaire right after answering demographic questions, but before playing the game.

The questions were taken from and rephrased based on the 5-point New Media Literacy Scale (NMLS) (Koc and Barut, 2016), where 1 - Strongly disagree, 2 - Disagree, 3 - Neither agree nor disagree, 4 - Agree, 5 - Strongly agree.

Master Thesis Study

We are 3 students from the Medialogy Master's programme at Aalborg University Copenhagen. This is a study on video games for our final Master thesis project in collaboration with Get Media Savvy.

You will be presented with a video game prototype and a survey. The whole procedure should take up to 40-50 minutes, including ~30 minutes of gameplay.

All the information collected in the session will be stored until the students' exam, which shall take place in June 2023. We may publish and discuss results from this session in our semester report, but the individual information there will be anonymous.

The participation is voluntary, and you may withdraw at any point. In case of withdrawal, the group is obliged to destroy your provided data immediately once we are informed about the withdrawal. If you have any questions, you can reach us via e-mail: *enlitgames@gmail.com*

* Indicates required question

1. I have read the description of the testing and of my rights as the participant presented above. I hereby voluntarily agree to participate in the study. *

   Mark only one oval.

   - ◯ Yes
   - ◯ No

General Information

Directions: The term "media" used in the following items, unless otherwise specified, refers to current digital technology platforms including but not limited to web sites, online forums, social networks, video sharing sites and virtual worlds in which anyone can share any digital content.

You are now asked to provide some general information about yourself and your media consumption habits.

2. Please indicate your age *

_____

3. Please indicate your gender *

Mark only one oval.

- ◯ Male
- ◯ Female
- ◯ Non-binary
- ◯ Other

4. Please indicate your country of residence *

_____

5. How often do you **consume** media content? *

Mark only one oval.

- ◯ More than once a day
- ◯ Once a day
- ◯ Several times a week
- ◯ Once a week
- ◯ Less than once a week
- ◯ Several times a month
- ◯ Less than once a month

6. How often do you **post** or **contribute to** media content? *

(Ex: Sharing content, engaging in discussions on social media, etc.)

Mark only one oval.

- ◯ More than once a day
- ◯ Once a day
- ◯ Several times a week
- ◯ Once a week
- ◯ Less than once a week
- ◯ Several times a month
- ◯ Less than once a month

7. How many hours each week (on average) do you spend playing video games? *

Mark only one oval.

- ◯ I do not play video games
- ◯ Less than 3 hours per week
- ◯ 4 - 7 hours per week
- ◯ 8 - 11 hours per week
- ◯ 12 - 15 hours per week
- ◯ 16 or more hours per week

Download or Launch the Game Prototype

Please follow this link to launch the prototype game. **Do not close this form.**

Web of Lies Game Prototype (web version)
(For Mac users, please open the game in Chrome)

You can also download the game for Windows:
https://drive.google.com/drive/folders/1-q3t3cMRsNkwqNYc8QLWb7Fgh9NiiDqP?usp=share_link

Instructions: extract the downloaded folder and run "WebOfLies.exe"

Continue with this form only after playing the game.

8. How many stages of the game have you completed? *

The game ends after completing 7 stages and reaching the "Mission Success" screen.

Mark only one oval.

- ◯ None
- ◯ A few (ended at stage 1-3)
- ◯ Most (ended at stage 4-6)
- ◯ All 7 stages

Questionnaire

Directions: The term “media” used in the following items, unless otherwise specified, refers to current digital technology platforms including but not limited to web sites, online forums, social networks, video sharing sites and virtual worlds in which anyone can share any digital content.

Please indicate to what extent you agree to the following statements.

9. I am interested in learning about the differences between the explicit and implicit messages in media *

(Explicit messages: fully revealed or expressed without vagueness, implication, or ambiguity - Implicit messages: suggested though not directly expressed)

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

10. I am interested in the economic impact of media content *

(Ex: changes in the stock market, influence on what people purchase)

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

11. I am interested in the political impact of media content *

(Ex: changes in opinion of political topics and candidates)

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

12. I am interested in the social impact of media content *
(Ex: changes in people's opinions and treatment of each other)

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

13. I am interested in understanding the opinions of people sharing media content that doesn't align with my own views. *

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

14. I am interested in understanding implicit media messages. *
(Implicit messages: suggested though not directly expressed)

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

15. I am interested in learning about the different functions of media. *
(communication, entertainment, etc.)

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

16. I am interested in learning to identify media content that has commercial messages. *

(Commercial: making or intended to make a profit)

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

17. I am interested in learning about the negative effects of media content on individuals. *

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

18. I am interested in learning about the positive effects of media content on individuals. *

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

19. I am interested in assessing the credibility of media. *
(Credibility: a measure of being trustworthy and believable.)

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

20. I am interested in assessing the objectivity of media. *
(Objectivity: being based on facts and not influenced by personal beliefs or feelings.)

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

21. I am interested in assessing the currency of media. *
(Currency of media: how recent/relevant the content is.)

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

22. I am interested in participating in social media environments to better understand others' opinions. *

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

23. I am interested in producing media sharing views on current matters from different perspectives (social, economical, ideological etc.) *
(Producing media: making videos, sharing images, writing posts, etc.)

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

24. I am interested in learning to produce media content that reflects critical thinking. *
(Producing media: making videos, sharing images, writing posts, etc.)

Mark only one oval.

	1	2	3	4	5	
Stro	◯	◯	◯	◯	◯	Strongly Agree

Feedback

Please write down any further comments that you wish to share about this experience.

25. If you experienced any technical issues, please describe them and how they influenced your gameplay.
Examples: lag, models disappearing, game crashing etc.

_____

26. If you have any additional comments, please add them here.

_____

APPENDIX E
DEMOGRAPHIC DATA

A. Experiment 1 Demographic Data

1) Nationalities: Country data and response frequency from the question *"Please indicate your country of residence"* for conditions A and B1. Sorted from most to least frequent (N = 88).

- Denmark: 36,
- Poland: 31,
- United States: 6,
- Lithuania: 4,
- Germany: 3,
- United Kingdom: 1,
- Estonia: 1,
- Iceland: 1,
- Norway: 1,
- Italy: 1,
- Netherlands: 1,
- Algeria: 1,
- Islamic Republic of Iran: 1.

2) Media Consumption: Response frequency from the question *"How often do you consume media content?"* for conditions A and B1 (N = 88).

- More than once a day: 74,
- Once a day: 8,
- Several times a week: 3,
- Several times a month: 2,
- Less than once a month: 1.

3) Gaming Habits: Response frequency from the question *"How many hours each week (on average) do you spend playing video games?"* for conditions A and B1 (N = 88).

- 16 or more hours per week: 19,
- 12 - 15 hours per week: 13,
- 8 - 11 hours per week: 12,
- 4 - 7 hours per week: 24,
- Less than 3 hours per week: 18,
- I do not play video games: 2.

4) Media Contribution: Response frequency from the question *"How often do you post or contribute to media content?"* for conditions A and B1 (N = 88).

- More than once a day: 17,
- Once a day: 4,
- Several times a week: 10,
- Once a week: 5,
- Less than once a week: 7,
- Several times a month: 3,
- Less than once a month: 42.

B. Experiment 2 Demographic Data

1) Nationalities: Country data and response frequency from the question *"Please indicate your country of residence"* for conditions B1 and B2. Sorted from most to least frequent (N = 44).

- Denmark: 21,
- Poland: 14,
- United States: 4,
- Lithuania: 2,

- Germany: 1,
- United Kingdom: 1,
- Estonia: 1.

2) Media Consumption: Response frequency from the question *"How often do you consume media content?"* for conditions B1 and B2 (N = 44).

- More than once a day: 36,
- Once a day: 5,
- Several times a week: 1,
- Several times a month: 2,

3) Media Contribution: Response frequency from the question *"How often do you post or contribute to media content?"* for conditions B1 and B2 (N = 44).

- More than once a day: 7,
- Once a day: 2,
- Several times a week: 6,
- Once a week: 2,
- Less than once a week: 5,
- Several times a month: 2,
- Less than once a month: 20.

4) Gaming Habits: Response frequency from the question *"How many hours each week (on average) do you spend playing video games?"* for conditions B1 and B2 (N = 44).

- 16 or more hours per week: 10,
- 12 - 15 hours per week: 8,
- 8 - 11 hours per week: 7,
- 4 - 7 hours per week: 12,
- Less than 3 hours per week: 6,
- I do not play video games: 1.